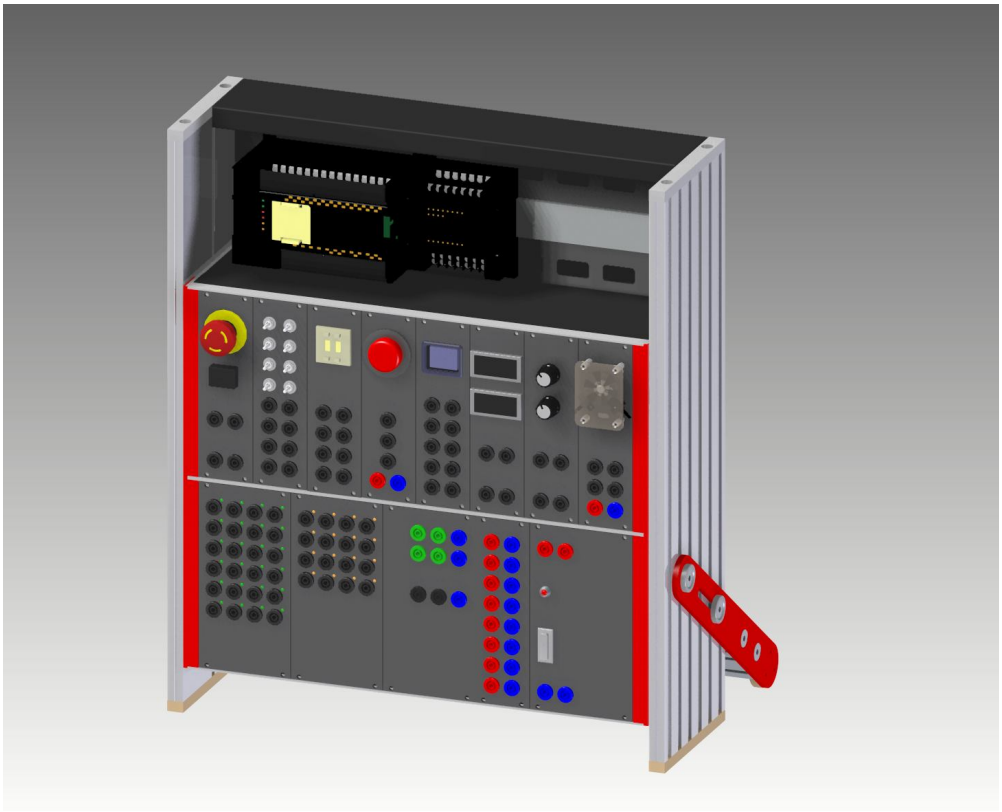
For PLC Operators

PLC TRAINING KIT

User Manual



◇ Please read carefully the instruction for safety before use.

◇ Please keep this user manual where is seen for users.

Project Name	PLC TRAINING KIT
Project Number	DDF
Customer	Neo powertech

[TOTAL PAGE 5]

	Date : July 1st, 2013
	Operator : DHANDY MECHA

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User Manual

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Date : July 1st 2013, The first edition

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◇ This user manual is including the general information for this equipment according to its purpose and the way it is used. However, the actual equipment delivered from DHANDY MECHA and contents in this manual may be different.

◇ Please contact DHANDY MECHA for incorrect contents or information needed.

◇ Please contact DHANDY MECHA when inconvenience or error on the equipment is found.

◇ Please contact DHANDY MECHAwhen extra components are in need.

◇ Please read and refer to user manual and catalog provided with the equipment and practice before use.

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Instruction for safety

Please follow the instruction for safety to prevent from incident and to use in right way.

Instruction for safety is distinguished by such warning and caution symbol and the following figures are their description.

Please read the instruction for safety before use.

Symbol of warning

	☐ Electrical Danger Indicating probability of high voltage electric shock, body injury or even death if violated
	☐ Warning Indicating probability of danger, body injury and even death if violated
	☐ Caution Indicating probability of danger, body injury or damage on the product if violated
	☐ Note Extra information and contents

Instruction for safety

1. When handling the equipment please check out surrounding there is no obstacle around the equipment.
2. Check out electrical system before powering the equipment.
3. During operation be aware of electric shock and surrounding.
4. Frequently check out equipment safety and condition to keep it in a good condition.
5. Do not use any uncertified devices except provided with product catalog and drawing.
6. Contact DHANDY MECHA if altering or remodeling equipment.
7. Use right power source so it works fine.
8. Use power outlet with its ground so it prevents from leaking electricity and electric shock.
9. Keep the equipment away from magnetic material to prevent from malfunction.
10. Keep the equipment in clean area and away from moisture atmosphere to prevent from over heat and error in the equipment.

Warnings in use

1. Do not ride over, smash, or drop off from a distance.
   - Caused error, damage, oil leak, or malfunction.

2. Do not place wet material around the equipment.
   - Caused electric shock.

3. Do not handle the electrical material or touch power plug with wet hands.
   - Caused electrical shock.

4. Do not cause problems that occur physical injury by inserting a part of physical body.
   - Caused physical injury.

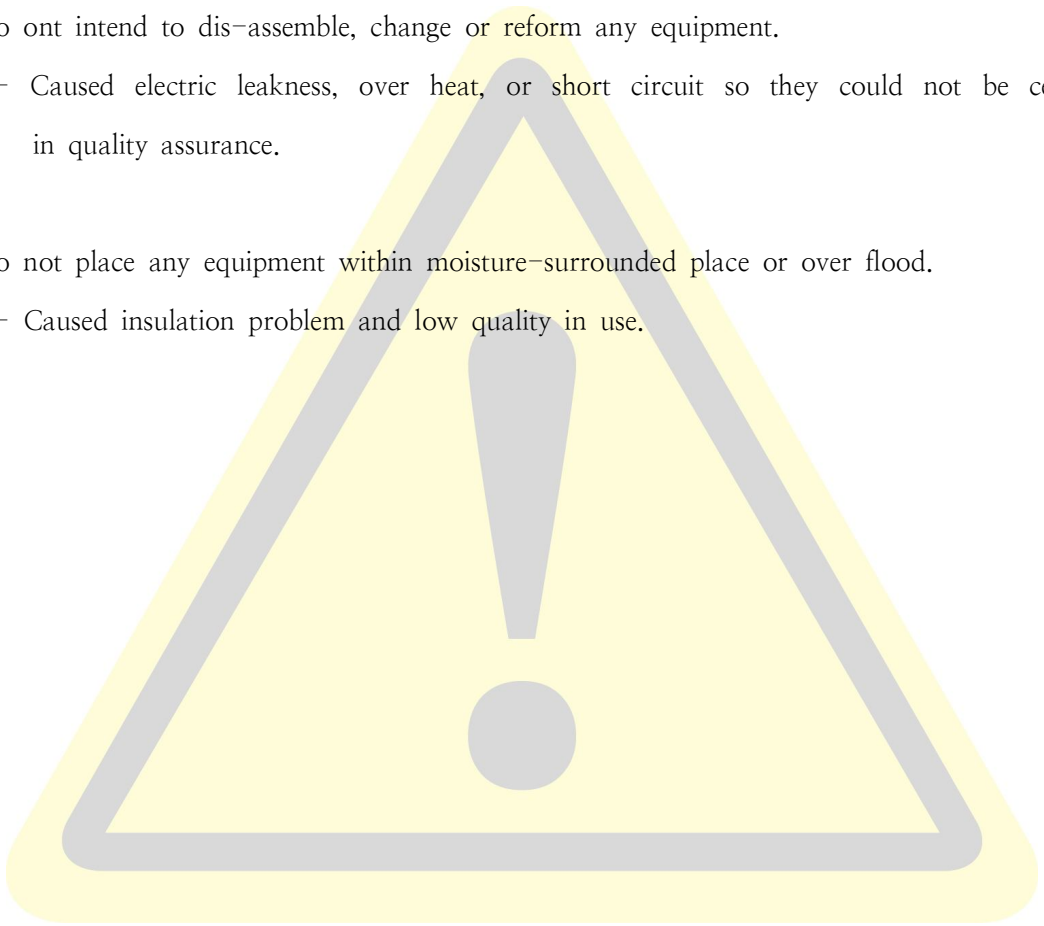
5. Do not use loose power cable.
   - Caused electric spark and fire on.

Electrical controller related safety instruction

1. Do ont change any electrical circuit.
   - Caused false operation and incorrect operation.

2. Do ont intend to dis-assemble, change or reform any equipment.
   - Caused electric leakness, over heat, or short circuit so they could not be certified in quality assurance.

3. Do not place any equipment within moisture-surrounded place or over flood.
   - Caused insulation problem and low quality in use.



Electrical controller-related safety instruction

1. Do not take any maintenance work or operation except the genuine operator.
   - Caused false operation, body injury or electric shock.

2. When maintaining, release out charged electrical power before use.
   - Caused body injury or electric shock.

3. Adjust bolts and screws with valued torque.
   - Caused over heat and emergency in fire.

4. Do not use wet fuse when replacing the fuse.
   - Caused body injury or electric shock.

5. Remove tools, cable wire, bolts, and washers after installation and maintenance.
   - Caused short circuit or emergency in fire.

6. When maintaining, turn off the main power and saty on test mode.
   - Caused electric shock.

7. Use proper multi test instrument to check out if the main power is off.
   - Caused electric shock.

8. Do not use any longer bolts than is provided.
   - Caused short circuit or emergency in fire.

9. During operation Do not wipe out the surface of products with wet materials.
   - Caused electric shock.

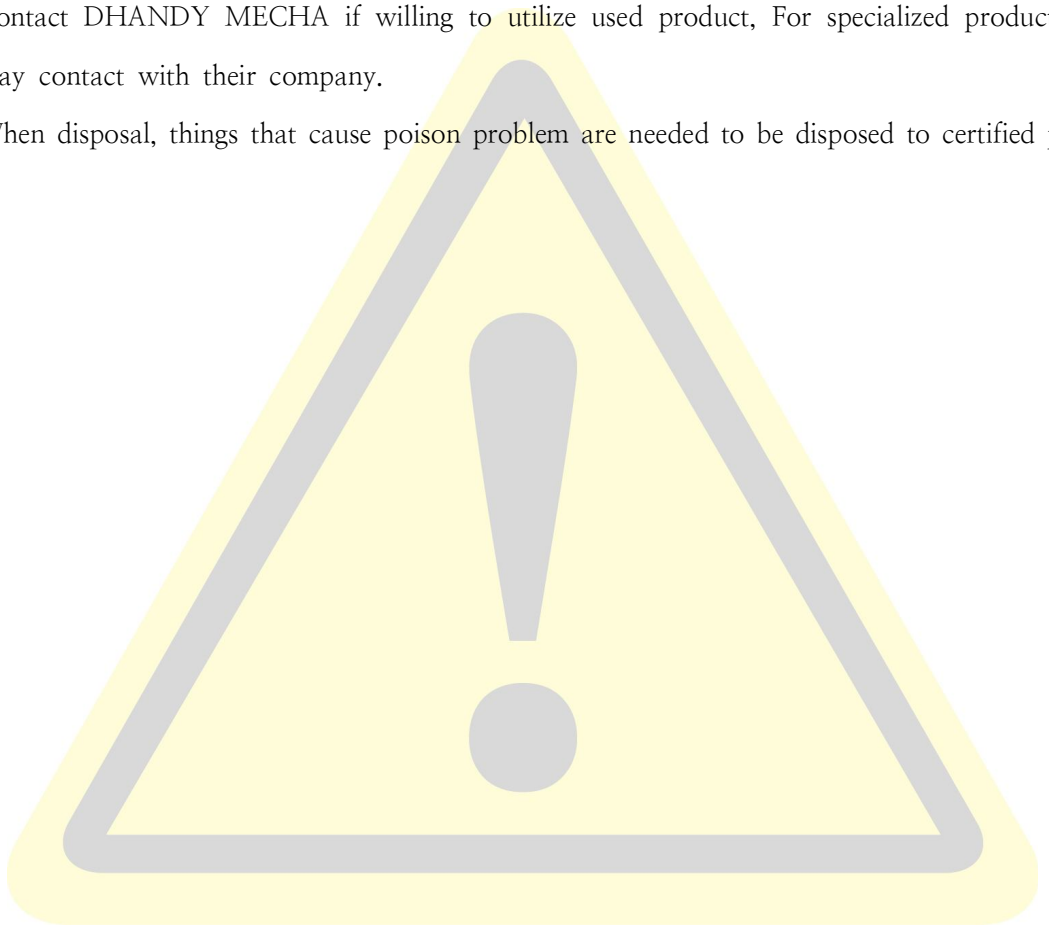
Instruction for maintenance and keep

1. Customers are prohibited to remodel any product.
2. Do not dis-assemble and re-assemble stadarized products because it causes products not working properly.
3. When moving or keeping, be aware of the temperature around the equipment.
4. Maintain the room temperature and moisture surrounding where the equipment is placed, otherwise, it causes malfunction and change in appearance.
5. Check connected wire and components. Otherwise it causes error and problem in the equipment.

☐ Proper temperature	18~28℃
☐ Proper moisture	40~60%

Disposal Instruction

1. Collect what could be re-used or not and dispose them where it is certified.
2. Contact DHANDY MECHA if willing to utilize used product, For specialized products you may contact with their company.
3. When disposal, things that cause poison problem are needed to be disposed to certified places.



Contact DHANDY MECHA when willing to dispose equipment. We will help you out.
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Phone : 031) 436-0150
Fax : 031) 436-0150

◈ Maintenance of Equipment

1. Considerations for maintenance

Performance and period of maintenance are determined by several conditions that are the following.

A. Operating Duration

Old equipment relatively to new equipment needs to be maintained frequently.

B. Importance of equipment

There are significant modules and insignificant modules and the period of maintenance needs to be dependent on it.

C. Surrounding conditions

The life of equipment will be dependent on how good the surrounding conditions are, inside or outside, how much moisture and poisoning gas present and presence of vibration, overheat, etc.

D. History of malfunction

There are modules that make trouble of bad conditions, so maintenance needs to be enhanced to prevent from problems that occur over again and again.

E. Overload

Modules with overload frequently used bad condition around, need to be maintained in a short period.

2. List of Maintenance

Follow the step below and cleaning, tightening the bolts like significant job will be also the following. Making the regular time schedule for maintenance is recommended.

A. Wiring check

a) Check out loose point of connection and short circuit.
b) Check out if there is connection problem.
c) Check out wires that disturb any moving part of equipment.

B. Checking equipment

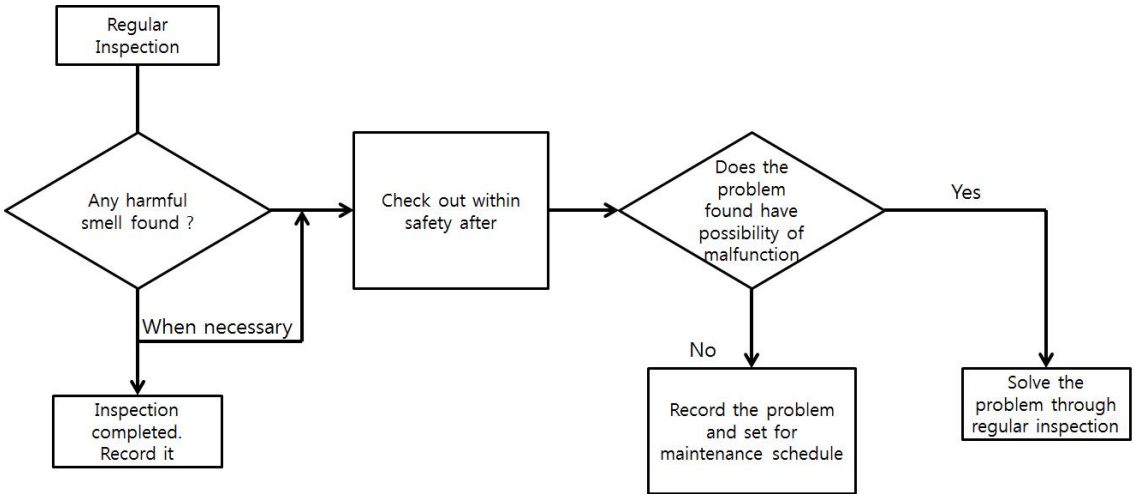
a) Check out if there is vibration and bad smell.
b) Check out any bolts loosing off.
c) Check out if there is any error in displacement of equipment.

C. Maintain of cleaning

a) Please remove any disturbance or obstacle around that gets equipment in trouble.
b) Check out whether indicator, lamp, or buzzer work fine or not.

3. Process

A. Normal type process


Regular Inspection
Any harmful smell found ?
When necessary
Inspection completed. Record it
Check out within safety after
Does the problem found have possibility of malfunction
Yes
No
Record the problem and set for maintenance schedule
Solve the problem through regular inspection

Picture 1 Normal type process example

B. Regular inspection process

<table>
<tr><th>No.</th><th>Process</th><th>Method and consideration</th></tr>
<tr><td>1</td><td>Place and environment</td><td>1. Vacuum type cleaning is recommended and be aware of level of moisture and pressure of the air used.
2. Remove dust and material before opening the cover
3. Wiping material should be chemically neutural and be careful with level of moisture.</td></tr>
<tr><td>2</td><td>strength of tightening bolts</td><td>1. Method of tightening
In case of tightening bolts use right material and components with the following
(1) Tighten bolts with the right torque wrench and strength.
(2) Tighten the nut.
(3) Do not tighten bolts only one side if there are more than two bolts
(4) Level of Torque
<table>
<tr><th>Bolt type</th><th>Torque (kgf.cm)</th><th>Bolt type</th><th>Torque (kgf.cm)</th></tr>
<tr><td>M3</td><td>6~8</td><td>M8</td><td>150~150</td></tr>
<tr><td>M4</td><td>15~20</td><td>M10</td><td>240~500</td></tr>
<tr><td>M5</td><td>30~40</td><td>M12</td><td>420~1020</td></tr>
<tr><td>M6</td><td>50~65</td><td>M16</td><td>1050~1300</td></tr>
</table></td></tr>
<tr><td>3</td><td>Part replacement</td><td>1. Survey the function and type when exchanging parts
2. Do not be confused of connection and do not forget to tighten bolts
3. Make sure to adjust parts if necessary
4. Let skilled-one work on soldering and complicated tasks</td></tr>
</table>

4. Steps for Emergency case

Num	Problems	Causes	Solutions	Note
1	Out of power	Out of power Less power level Broken fuse Switch error Outlet connection	- Checking input power - Checking the function of power switch - Checking fuse - Checking the power of power supply - Checking the power outlet	
2	Failure lamp function	Lamp broken Lamp life time Short circuit Out of power Staying emergency	- Changing lamp - Checking Control power - Checking circuit - Checking function	
3	Indicator error	Out of power Malfunction Short circuit	- Changing the indicator - Checking fuse - Checking with other instruments	Reference User manual
4	Switch out of control	Out of power Malfunction Breakdown Broken sensor Broken controller	- Inspection for PLC and controller - Inspecting switch and sensor	
5	Unknown noise	Obstacle Disturbance Equipment breakdown and deformation	Inspecting the equipment with the power completely off	
6	Malfunction	Equipment breakdown Out of power Strength of volt Obstacle	Inspecting the equipment with the power completely off	Reference User manual
7	Connection discolor	Bolt relaxation Overload use	Tightening the bolt with power off Adjusting the load	

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◈ Summary of Equipment

I. Purpose

The Purpose of the equipment is to gain PLC programming skill from base to advanced by utilizing this PLC practical kit within different task based on the requirements from users.

II. Specifications

A. Structured to function in a variety of practice in sizing and remodeling.

B. Able to perform multi tasks such as calculation and digital logic.

C. Able to perform with indicator, inverter, and servo driver.

D. Easy to hand and keep the equipment as a single body.

E. Structured for users to practice hands-on

F. Structured to use 4mm banana socket type to wire

G. Structured to adjust the angle customers want

H. Structured to utilize different sensors and automatic devices from outside to practice

I. Able to perform PWM control and analog control

J. Structured to install on frame module.

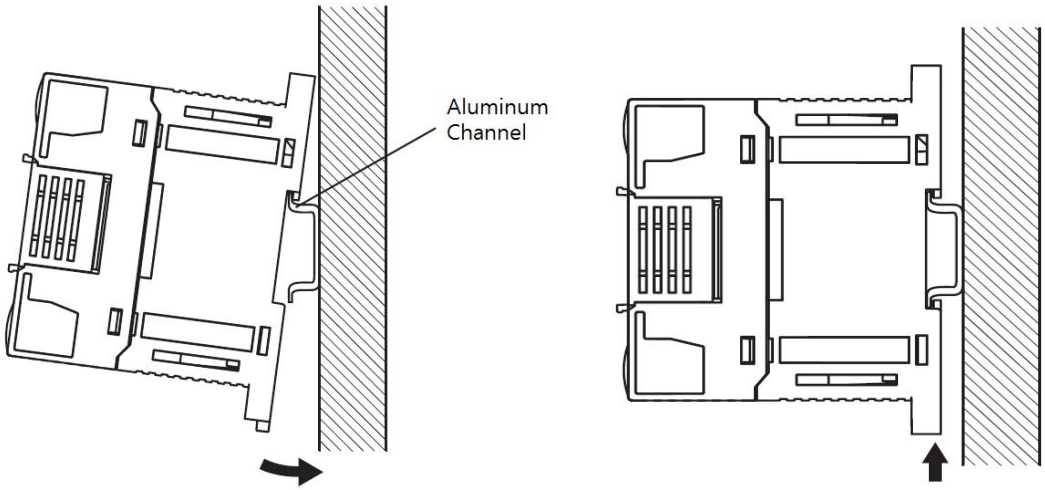
III. General Information

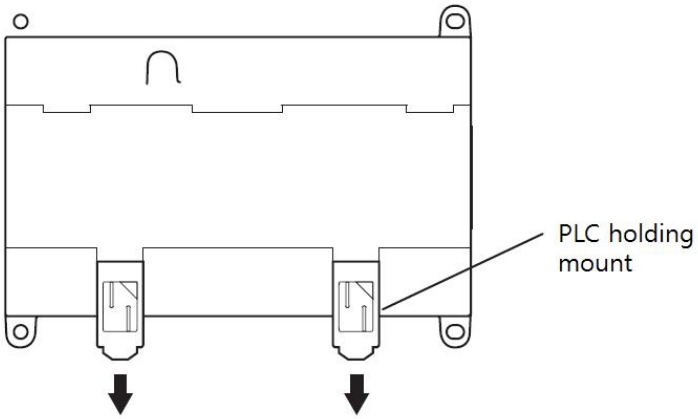
Name of equipment	PLC Training kit
Type of oepration	Manual type
Controller	PLC
Size	480(W) ×540(H) × 180(D)
Weight	About 10kg
Power used	DC24V, NPN TYPE
Temperature	-10~ +70℃
Main power	AC110-240V, 50/60Hz, 2A

◈ Module Assembly

I. PLC Assembly

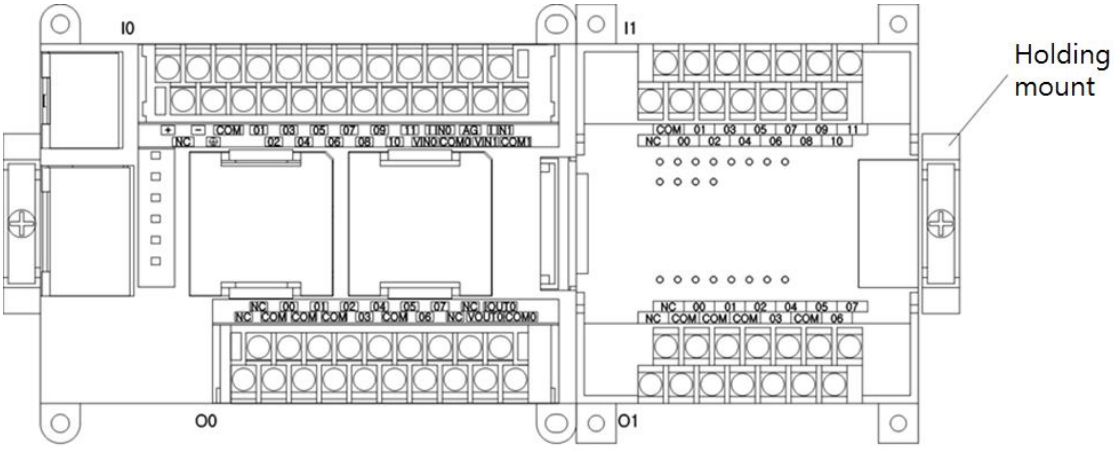
A. Installation on Aluminum channel





1. PInsert PLC on the aluminum channel .
2. Hold the top part and push in the bottom to be mounted.
3. When taking the PLC out of the channel pull out the sliding parts to take out the bottom part.
4. It can take PLC out of the channel if the sliding parts are completely removed from the channel

B. Installation by using mount



1. Use the holding mount on both sides left and right to fix PLC.

☐ Warning

The power should be turned off when taking out PLC.

☐ Caution

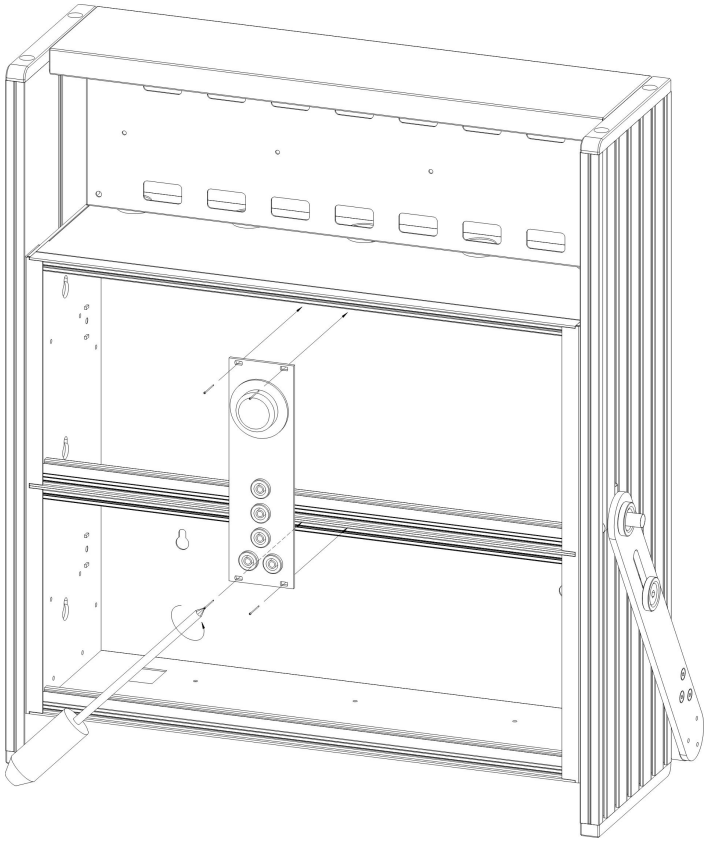
It should remove all cables connected to disassemble PLC unit or extra unit.

☐ Note

It's easy to take PLC out of the channel by using (-) screw driver and pulling down the PLC.

II. Module Assembly

A. By using bolts each module can be held on the frame.



☐ Warning

The power should be turned off when taking out PLC.

☐ Caution

It should remove all cables connected to disassemble PLC kit.

Apply the strength based on standard level to prevent from abrasion.

◈ List of components

※ Description of warning signs

☐ Electric Danger

Indicating probability of high voltage electric shock and body injury or even death if violated

☐ Warning

Indicating probability of danger if violated then it causes body injury or even death

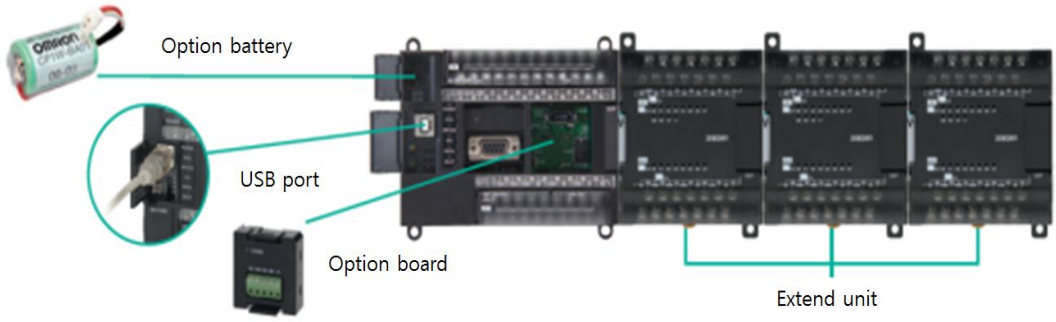
☐ Caution

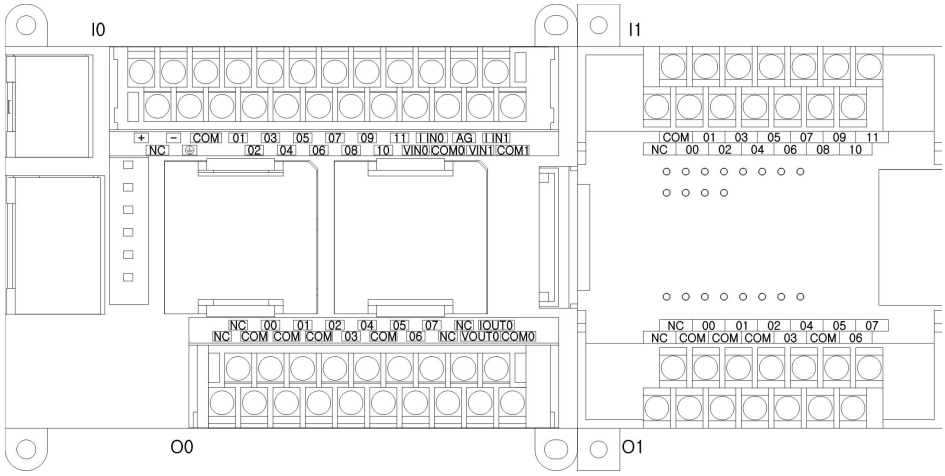
Indicating probability of danger if violated it causes body injury or damage on the products

☐ Note

Extra information and contents

I. Controller – PLC (OMRON)





I0, I1 : DIGITAL INPUT Module Kit, ANALOG IN/OUT Module Kit (one to one connection)
Q1, Q2 : DIGITAL OUTPUT Module Kit, ANALOG IN/OUT Module Kit (one to one connection)

A. Function and structure

1. Structures for different types of practical kit
2. Easy access to PLC programming tool through USB port
3. Multi port included to connect extra ports
4. Availability of RS-232C port
5. Availability of serial communication over option board
6. Analog input and output port included to perform the multi tasks
7. Input and output signal can be connected module kit
8. High speed counter function and pulse are installed to determine the location.
9. Able to install extra battery

B. Connection type

1. Wire PLC input and output to each module
2. Connect I0, I1 from the PLC to Q0, Q1 from digital input and output module respectively
3. Connect external ports when using extra unit
4. Connect DC 24V to PLC supplying ports
5. PLC input port (I0, I1) COM : (+) positive
6. PLC output port (Q0, Q1) COM : (-) Negative
7. Use PLC fixing blocks When installing PLC on the aluminum channel

C. List of components

1. PLC unit : 1 EA
   a) Model : CP1E-NA20DT [OMRON]
   b) Number of ports : 12 Inputs, 8 Outputs, 2 channel analog input, 1 channel analog output
   c) Option : 1 Battery (CP1W-BAT01) [OMRON]
2. PLC Extra PLC unit : 1 EA
   a) Model : CP1W-20EDT [OMRON]
   b) Number of ports : 12 Inputs, 8 Outputs

D. Module specification

Electricity / Mechanic	
Main Power	AC 100 ~ 240V
Input Voltage	DC 24V
Electric Current	0.02A
Connection type	Wire connector
Output type	Transistor (Sink, Source), Relay
Dimension (PLC Unit)	130(W) × 90(H) × 85(D)
Dimension (PLC Extra Unit)	90(W) × 85(H) × 55(D)

□ Note

Detail information and specification are described in the user manual that the product company provided.

www.ia.omron.co.kr

E. PLC I/O List

PIN	I0	I1
+	24V	
-	0V	
⏚	FG	
NC	-	-
COM	24V	24V
0	I00	I0C
1	I01	I0D
2	I02	I0E
3	I03	I0F
4	I04	I10
5	I05	I11
6	I06	I12
7	I07	I13
8	I08	I14
9	I09	I15
10	I0A	I16
11	I0B	I17
VIN0	VIN0	
IIN0	IIN0	
COM	COM	
VIN1	VIN1	
IIN1	IIN1	
COM	COM	

PIN	Q0	Q1
NC	-	-
NC	-	-
COM	0V	0V
0	Q00	Q08
1	Q01	Q09
2	Q02	Q0A
3	Q03	Q0B
4	Q04	Q0C
5	Q05	Q0D
6	Q06	Q0E
7	Q07	Q0F
VOUT0	VOUT0	
IOUT0	IOUT0	
COM	COM	

II. EMG S/W & BUZZER

A. Function and Structure

1. EMG S/W & BUZZER module help PLC kit in function
2. This module allows to connect input and output of PLC by using 4mm safety socket.
3. PLC input signal is connected to the controller by using EMG S/W
4. PLC output signal is connected to Buzzer by using 4mm safety socket

B. Connection type

1. Connect the port of switch and Buzzer to the input and output on PLC
2. Connect switch S0 to H0, H1
3. Connect Buzzer B0 to H2 and H3
4. Use the mounting bolt to install on the frame

C. compositions

1. Buzzer : 1 EA
2. Emergency switch : 1 EA (1b, Turn-reset type)

D. Module specification

Electricity / Mechanism	
Power used	DC 24V
Input / Output	Max. DC 24V
Connection type	4mm Safety socket
Dimension	50(W) × 173(H) × 105(D)

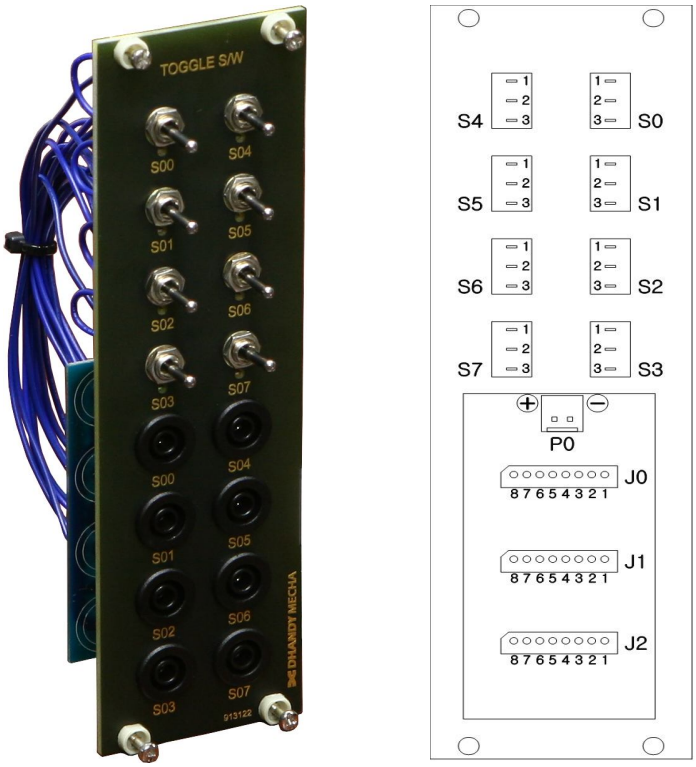
E. PCB connecter pin assign

PIN	S0	B0
1	-	H2
2	H0	H3
3	H1	-
4	-	-

□ Caution

Do not apply much strength on the equipment, it may cause damage on it.

III. TOGGLE S/W



J0 : TOGGLE S/W connection
J2 : TOGGLE S/W connection
P0 : DC24V connection

A. Function and Structure

1. Togle S/W module helps PLC kit in function
2. This module allows to connect the power of PLC through 4mm safety socket
3. PLC input signal is connected to the controller by using Toggle S/W니다.
4. Each Toggle S/W has function of up switch and down switch : holding and return

B. Connection type

1. Connect 8 pin connector to Toggle S/W ports
2. connect from S0 to S7 to from J0 to J2
3. Supply DC 24V to P0
4. Use the mounting bolt to install on the frame

C. Composition

1. Toggle S/W : 8 EA
2. Function : Remain(Up), Return(Down)

D. Module Specification

Electricity / Mechanism	
Power used	DC 24V
Input Power	Max. DC 24V
Connection type	4mm Safety socket
Dimension	50(W) × 173(H) × 105(D)

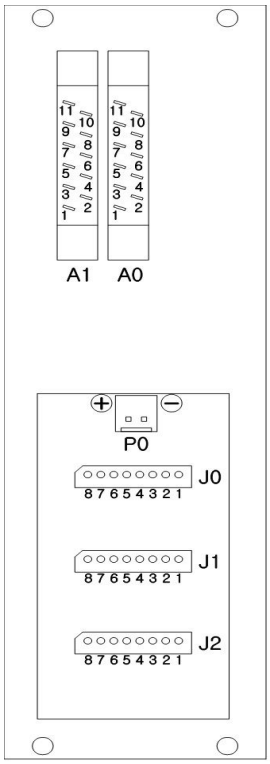
E. PCB connecter pin assign

PIN	J0	J1	J2
1	S0 (1,3)	-	S0 (2)
2	S1 (1,3)	-	S1 (2)
3	S2 (1,3)	-	S2 (2)
4	S3 (1,3)	-	S3 (2)
5	S4 (1,3)	-	S4 (2)
6	S5 (1,3)	-	S5 (2)
7	S6 (1,3)	-	S6 (2)
8	S7 (1,3)	-	S7 (2)

□ Caution

Do not apply much strength on the equipment, it may cause damage on it.

IV. SUM ROTARY S/W



A0, A1 : J0, J1 connection
J0, J2 : A0, A1 connection
P0 : DC24V connection

A. Function and Structure

1. SUM ROTARY S/W module helps PLC kit in function.
2. This module allows to connect input and output of PLC by using 4mm safely socket.
3. PLC input signal is connected to the controller by using SUM ROTARY S/W
4. Increased by one when pushing (+) button, Decreased by one when pushing (−) button.
5. The number on the module of SUM ROTARY S/W is displayed in BCD code.

B. Connection type

1. Cnnect 8 pin connector to SUM ROTARY S/W ports
2. Connect A0 and A1 to J0 and J2
3. Supply 24V to P0
4. Use the mounting bolts to install on the frame

C. Composition

1. ROTARY S/W : 2 EA
2. Indication : 0~9

D. Module specification

Electricity / Mechanism	
Power used	DC 24V
Input power	Max. DC 24V
Connection type	4mm safety socket
Dimension	50(W) × 173(H) × 105(D)

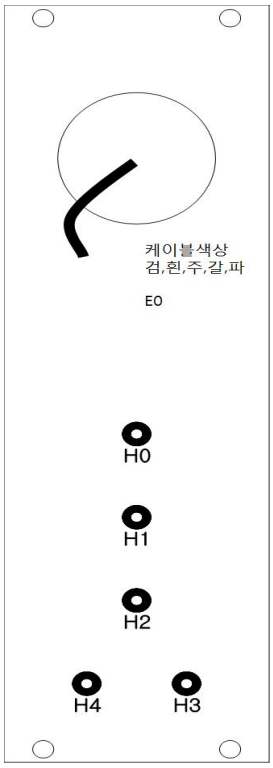
E. PCB connecter pin assign

PIN	A0	A1	J0	J1	J2
1	-	-	A0 (5)	-	A0 (3)
2	-	-	A0 (7)	-	A1 (3)
3	J2 (1)	J2 (2)	A0 (9)	-	-
4	-	-	A0 (11)	-	-
5	J0 (1)	J0 (5)	A1 (5)	-	-
6	-	-	A1 (7)	-	-
7	J0 (2)	J0 (6)	A1 (9)	-	-
8	-	-	A1 (11)	-	-
9	J0 (3)	J0 (7)			
10	-	-			
11	J0 (4)	J0 (8)			

□ Caution

Do not apply much strength on the equipment, it may cause damage on it.

V. ROTARY ENCODER



A. Function and Structure

1. ROTARY ENCODER module helps PLC kit in function.
2. This module allows to connect the analog input of PLC by using 4mm safety socket.
3. PLC input signal is connected to the controller by using ROTARY CODER.
4. Output signals on A,B and Z come from the encoder by adjusting the volume.
5. The signals of A,B, and Z are pulse type.

B. Connection type

1. Connect encoder ports to PLC input connector.
2. Connect encoder output signal A, B, and Z to Ho, H1, and H2, respectively.
3. Connect the power port of the encoder to H3 and H4.
4. Use the mounting bolts to install on the frame.

C. Composition

1. ROTARY ENCODER : 1 EA
2. MODEL : E30S-4-360-3-N-24 [AUTONICS]
3. OUTPUT : 3 ports (A, B, Z port)
4. 1 360pulse per one rotation
5. Control output : NPN open collector output
6. Aluminum handle knob for indicating values applied

D. Module Specification

Electricity / Mechanism	
Power used	DC 24V
Input power	Max. DC 24V
Connection type	4mm Safety socket
Dimension	50(W) × 173(H) × 105(D)

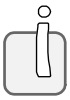
E. PCB connecter pin assign

PIN	E0
Black	H0
White	H1
Orange	H2
Brown	H3
Blue	H4

□ Caution

Please read the user manual and description especially wiring related tasks before use.

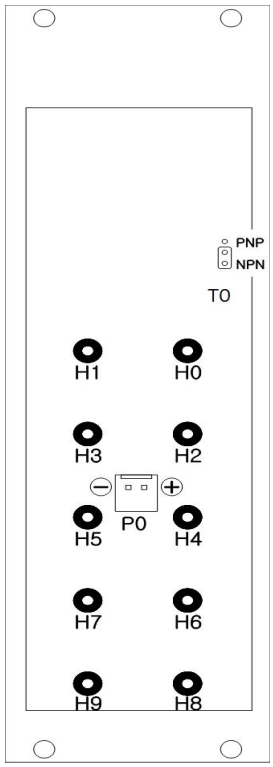
Poor attention and mishandling may cause damage or breakdown for the products



□ Note

Refer to the user manual that offers detail description and control method.

VI. FND (7 - SEGMENTS)



T0 : PNP, NPN setup
P0 : DC24V connection

A. Function and Structure

1. FND (7-SEGMENTS) module helps PLC kit in function.
2. This module allows to connect iput and output of PLC by using 4mm safety socket.
3. PLC input signal is connected to the controller by using FND (7-SEGMENTS).
4. The number on the display of FND (7-SEGMENTS) is translated into BCD output code.
5. There are PNP and NPN FND (7-SEGMENTS) function types.

B. Connection type

1. Solder connector FND (7-SEGMENTS)on the PCB.
2. Choose NPN type from T0.
3. Supply 24V to P0.
4. Use the mounting bolts to install on the frame.

C. Composition

1. FND (7-Segment) : 1 EA
2. 2 RED LED
3. Size of the segment : 14.2mm
4. Alphabetical indicator : A~F
5. Function of NPN and PNP circuit by using jumper pin,
6. Protection circuit for Over current and reverse current.
7. Range of DC power
   a) High : DC 1.2V~30V
   b) Low : DC 0V~0.6V

D. Module Specification

Electricity / Mechanism	
Power used	DC 24V
Electric current	20mA 이하
Response frequency	최대 5KHz
Input resistor	20K Ohm
Connection type	4mm safety socket
Dimension	50(W) × 173(H) × 60(D)

□ Danger

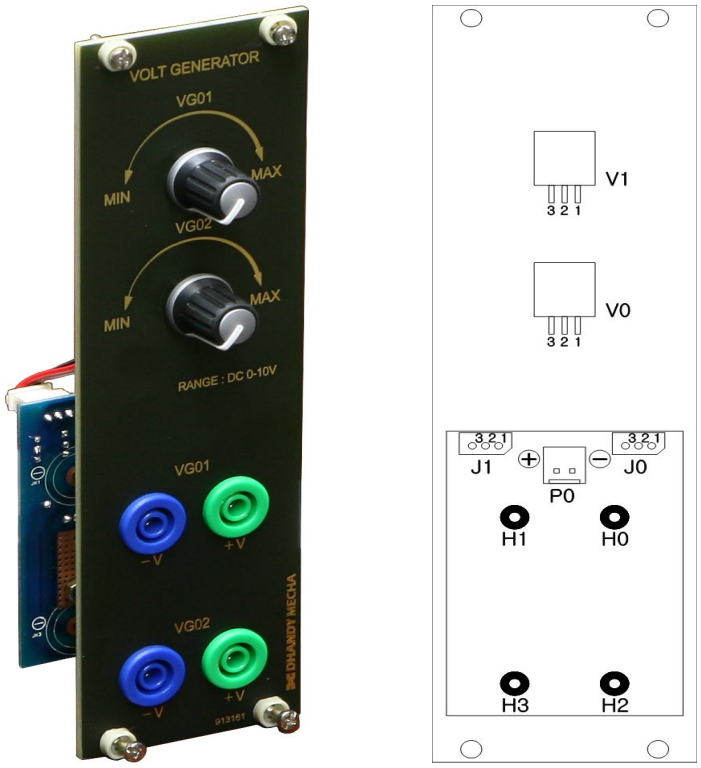
Use only the DC 24V power supplied by the equipment.

It may make trouble if the power comes from outside source.

Do not intentionally change the circuit.

It may get the equipment in trouble and malfunction.

VII. VOLT GENERATOR



VO, V1 : J0, J1 Connection
P0 : DC24V Connection

A. Function and Structure

1. VOLT GENERATOR module helps PLC kit in function
2. This module allows to connect iput and output of PLC by using 4mm safety socket.
3. PLC input signal is connected to the controller by using SUM ROTARY S/W
4. Voltage depends on the volume of the VOLT GENERATOR.

B. Connection type

1. Solder VOLT GENERATOR on the PCB.
2. Connect V0 and V1 to J0 and J2.
3. Supply DC 24V to 2 pin connector.
4. Use the mounting bolt to install on the frame.

C. Composition

1. Electric current creator : 2 EA
2. RANGE : DC 0~10V
3. Volume resistor : 10k Ohm
4. Over Current protector installed in the circuit.
5. Output resistor : 470 Ohm

D. Module specification

Electricity / Mechanism	
Power used	DC 24V
RANGE	DC 0~10V
Connection type	4mm 안전 소켓
Dimension	50(W) × 173(H) × 105(D)
Able to change the specification of the module	

E. PCB connecter pin assign

PIN	V0	V1	J0	J1
1	J0 (1)	J1 (1)	V0 (1)	V1 (1)
2	J0 (2)	J1 (2)	V0 (2)	V1 (2)
3	J0 (3)	J1 (3)	V0 (3)	V1 (3)

□ Danger

Use only the DC 24V power supplied by the equipment.

It may make trouble if the power comes from outside source.

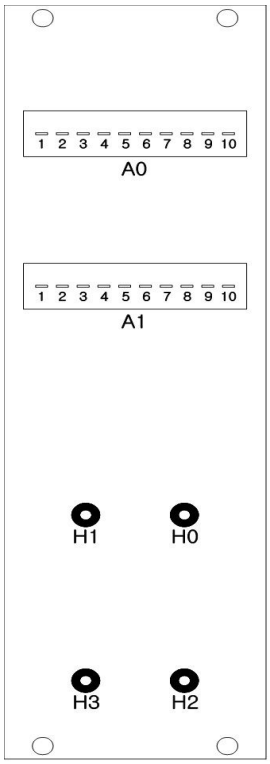
Do not intentionally change the circuit.

It may get the equipment in trouble and malfunction. .

□ Caution

Do not apply much strength on the equipment, it may cause damage on it.

VIII. VOLT & AMPERE METER



A0 : H0, H1 socket connection
A1 : H2, H3 socket connection

A. Function and Structure

1. VOLT & AMPERE METER module helps PLC kit in function.
2. This module allows to connect the power of PLC through 4mm safety socket.
3. PLC analog input signal is controlled by VOLT & AMPERE METER.
4. The variable voltage value is indicated on VOLT METER in number and the variable Ampere value is indicated on AMPERE METER in number.

B. Connection type

1. Solder VOLT & AMPERE METER connector on the PCB.
2. Connect A0 and A1 connectors to H0, H1, H2, and H3.
3. Supply DC 24V to 2 pin connector.
4. Use the mounting bolt to install on the frame.

C. Composition

1. Current indicator: 1 channel, 1 channel of electric current indicator (2 total)
2. Model : M4N-DV-13, M4N-DA-13 [AUTONICS]
3. Number of digit : 4digit (7segment RED LED)
4. Input power : 19.99V
5. Range of tolerance : ±0.2%
6. Period of sample : 300ms
7. Function type : Binomial type
8. Period : 2.5 cycle/min

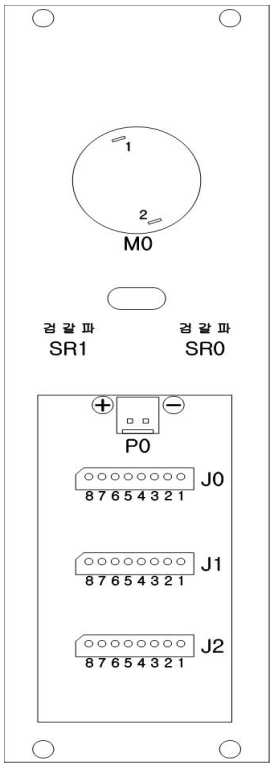
D. Module specification

Electricity / Mechanism	
Power used	DC 24V
Voltage	Range : 0~10V
Current	Range : 4~20mA
Connection type	4mm safety socket
Dimension	50(W) × 173(H) × 105(D)

E. PCB connecter pin assign

PIN	A0	A1
1	24V	24V
2	0V	0V
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	H0	H2
10	H1	H3

IX. MOTOR & SENSOR



M0 : J0 connector
SR0, SR1 : J0, J1, J2 connection
P0 : J0 connection

A. 구조와 기능

1. MOTOR & SENSOR module helps PLC kit in function.
2. This module allows to connect the power of PLC through 4mm safety socket.
3. PLC input signal is connected to the controller by using MOTOR & SENSOR.
4. PLC output signal is connected into MOTOR & SENSOR by using 4mm safety socket.
5. Motor is controlled by producing pulse from the pulse generator PWM.

B. Connection Type

1. Connect 8 pin connector to MOTOR & SENSOR module connector.
2. Connect M0 port to J0 connector.
3. Connect SR0 and SR1 ports to J0, J1, and J2 connector.
4. Supply DC 24V to P0 through J0 connector.
5. Use the mounting bolt to install on the frame.

C. Compositions

1. DC gear motor : 1 EA
   a) Model : [GGM]
   b) Speed reducer installed inside (1/30)
   c) Period : about 190rpm
   d) Output torque : 0.39kgf>cm
2. 2 Micro photo sensor
   a) Model: EE-SX912-R, EE-SX913-R [OMRON]
   b) Allowed Current: 100mA Max
   c) Response frequency : 1kHz min

D. Module Specification

Electricity / Mechanism	
Power used	DC 24V
Current	Below 15mA ~ 0.3A
Connection type	4mm safety socket
Dimension	50(W) × 173(H) × 105(D)

E. PCB connecter pin assign

PIN	J0	J1	J2	M0
1	-	SR0 (Brn)	SR1 (Brn)	J0 (2)
2	M0 (2)	SR0 (Blu)	SR1 (Blu)	J0 (6)
3	SR0 (Blk)			
4	P0 (⊕)			
5	-			
6	M0 (1)			
7	SR1 (Blk)			
8	P0 (⊖)			

PIN	SR0	SR1
Black	J0 (3)	J0 (7)
Brown	J1 (1)	J1 (2)
Blue	J2 (1)	J2 (2)

□ Danger

Use only the DC 24V power supplied by the equipment.

It may make trouble if the power comes from outside source.

회Do not intentionally change the circuit.

It may get the equipment in trouble and malfunction.

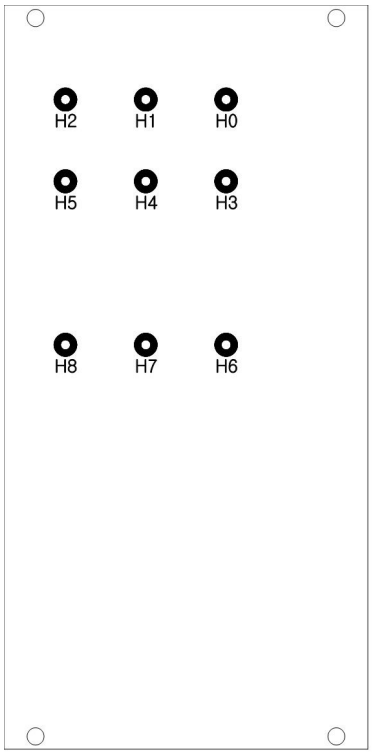
□ Caution

1. Check out if there is any disturbance around the moving parts.
2. Check out if there is any disturbance around the sensors
3. Frequently check out the function of sensors.

□ Note

Refer to the user manual that offers detail description and control method.

X. ANALOG IN/OUT



A. Function and Structure

1. ANALOG IN/OUT module helps PLC kit in function.
2. This module allows to connect analog input and output of PLC by using 4mm safety socket.
3. PLC analog input signal is connected to the controller by using ANALOG IN/OUT
4. PLC analog output signal is connected to the controller by using ANALOG IN/OUT.

B. Connection Type

1. Connect ANALOG IN/OUT ports to PLC analog input and output.
2. Connect from A0 to A5 to PLC analog input ports.
3. Connect from A6 to A8 to PLC analog output ports.
4. Use the mounting bolts to install on the frame.

C. Compositions

1. 2 channels for current and voltage, 1 output channel.

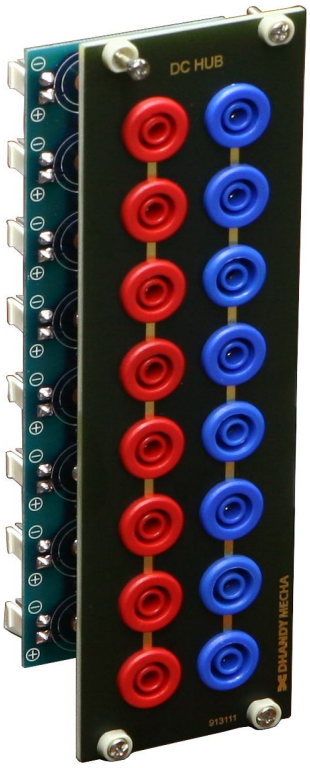
D. Module Specification

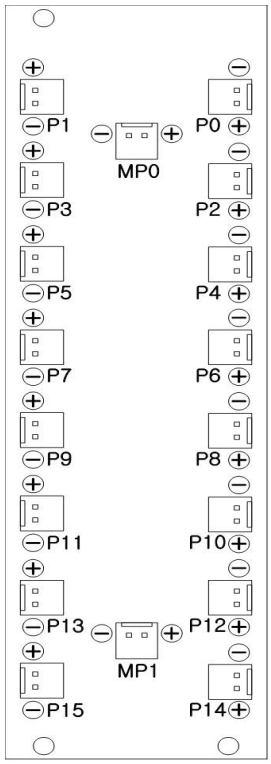
Electricity / Michanism	
Power used	DC 24V
Connection type	4mm Safety socket
Dimensions	86(W) × 173(H) × 105(D)

E. PCB connecter pin assign

PIN	H
0	AD00(V)
1	AD00(I)
2	COM
3	AD01(V)
4	AD01(I)
5	COM
6	DA00(V)
7	DA00(I)
8	COM

XI. DC HUB





MP0, MP1 : MAIN DC24V
P0~P15 : SUB DC24V

A. Function and Structure

1. DC HUB module helps PLC kit in function.
2. This module allows to supply DC 24V to PLC kit by using 4mm safety socket.
3. DC24V power will be supplied to each different modules through DC HUB by using 4mm safety socket.
4. Red sockets supply DC 24V and 0V from blue sockets.

B. Connection type

1. Supply DC 24V to MP0 and MP1 through 2 pin connector.
2. Pin from P0 to P15 supply DC 24V to each different modules.
3. Use the mounting bolts to install on the frame.

C. Compositions

1. 8 power distributing ports.

D. Module Specification

Electricity / Mechanism	
Power used	DC 24V
Connector type	4mm Safety socket
Dimension	50(W) × 173(H) × 105(D)

□ Danger

Use only the DC 24V power supplied by the equipment.

It may make trouble if the power comes from outside source.

Do not intentionally change the circuit.

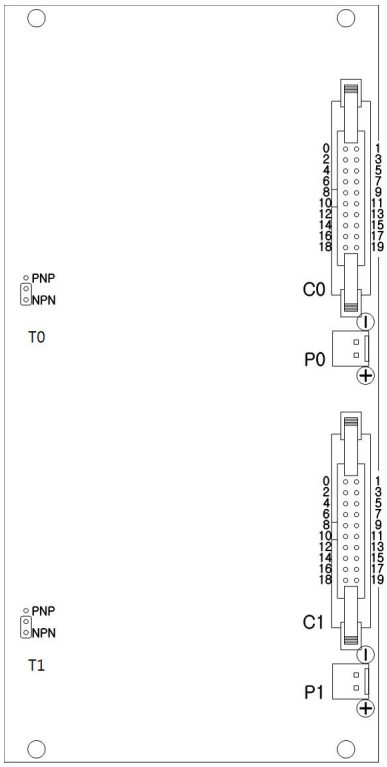
It may get the equipment in trouble and malfunction.

□ Danger

Do not use loose or damaged connector

Electric shock or in case of fire.

XII. DIGITAL INPUT 24P (NPN)



C0, C1 : PLC Input connection
T0, T1 : PNP, NPN set up
P0, P1 : DC24V connection

A. Function and Structure

1. DIGITAL INPUT 24P module helps PLC kit in function.
2. This module allows to connect to the power of the input of PLC by using 4mm safety socket.
3. PLC input signal is onnected to the controller by using DIGITAL INPUT 24P module.
4. PLC ON/OFF sign is known by the LED of DIGITAL INPUT 24P module.

B. Connection Type

1. Connect DIGITAL INPUT 24P port to PLC input ports by using 20 pin connector
2. Choose NPN type of TO and T1.
3. Supply DC 24V to P0 and P1 by using 2 pin connector.
4. Use the mounting bolts to install on the frame.

C. Composition

1. Input : 24 points
2. Individual status indicating LED installed inside.
   a) Color : Green

D. Module Specification

Electricity / Mechanism	
Power used	DC 24V
Input current	Max. DC 24V
Connection type	4mm Safety socket
Dimension	86(W) × 173(H) × 105(D)

E. PCB connecter pin assign

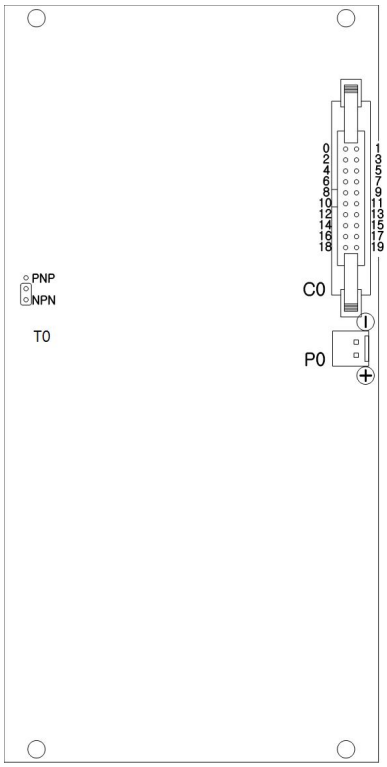
PLC MAIN unit				PLC extra unit			
PIN	C0	PIN	C0	PIN	C1	PIN	C1
0	I00	8	I08	0	I04	8	-
1	I01	9	I09	1	I05	9	-
2	I02	10	I10	2	I06	10	-
3	I03	11	I11	3	I07	11	-
4	I04	12	I00 (extra)	4	I08	12	-
5	I05	13	I01 (extra)	5	I09	13	-
6	I06	14	I02 (extra)	6	I10	14	-
7	I07	15	I03 (extra)	7	I11	15	-
16	24V	17	24V	16	24V	17	0V
18	0V	19	0V	18	24V	19	0V

□ Danger

Do not intentionally change the circuit

It causes malfunction and error in function.

XIII. DIGITAL OUTPUT 16P (NPN)



C0 : PLC input connection
T0 : PNP, NPN setup
P0 : DC24V connection

A. Function and Structure

1. DIGITAL OUTPUT 16P module helps PLC kit in function.
2. This module allows to connect to the output power of PLC.
3. PLC output signal is connected to the controller by using DIGITAL OUTPUT 16P module.
4. PLC ON/OFF sign is known by the LED of DIGITAL INPUT 16P module.

B. Connection type

1. Connect DIGITAL INPUT 16P port to PLC input ports by using 20 pin connector
2. Choose NPN type of TO
3. Supply DC 24V to P0 and P1 by using 2 pin connector.
4. Use the mounting bolts to install on the frame.

C. Composition

1. Output : 16points
2. Individual status indicating LED installed inside
   a) Color : RED

D. Module Specification

Electricity / Mechanism	
Power used	DC 24V
Output power	Max. DC 24V
Connection type	4mm Safety socket
Dimension	86(W) × 173(H) × 105(D)

E. PCB connecter pin assign

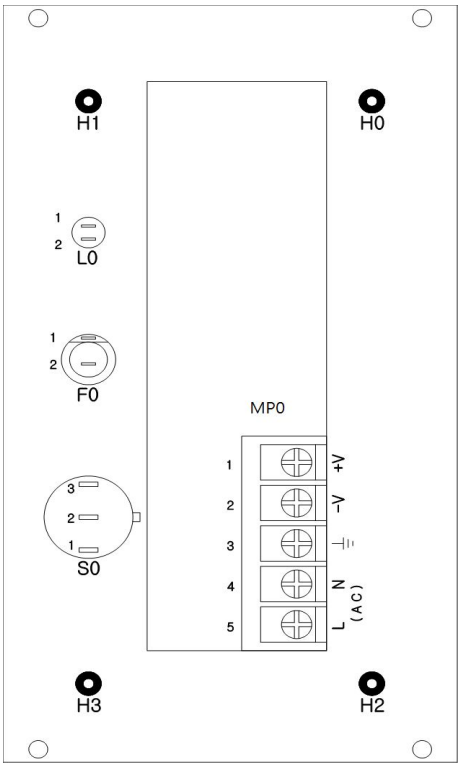
PLC MAIN unit		PLC extra unit	
PIN	C0	PIN	C0
0	O00	8	O00
1	O01	9	O01
2	O02	10	O02
3	O03	11	O03
4	O04	12	O04
5	O05	13	O05
6	O06	14	O06
7	O07	15	O07
16	24V	17	24V
18	0V	19	0V

□ Danger

Do not intentionally change the circuit

It causes malfunction and error in function.

XIV. POWER SUPPLY



F0 : Connection to the main power ports
L0 : Connection to DC 24V
S0 : MAIN power connection

A. Function and Structure

1. POWER SUPPLY module helps PLC kit in function.
2. This module supplies all devices used with PLC kit by using 4mm safety socket.
3. ON/OFF for Supplying DC24V is checked by LED in the power supply.
4. A fuse is installed to protect modules in the power supply.

B. Connection type

1. Connect Power supply module ports to the PCB of switches , fuses, and LEDs.
2. AC110V~240V is supplied by the switch to POWER SUPPLY module.
3. DC 24V converted from the Power supply through the fuse and LED is supplied Ho, H1, H2, and H3.
4. Use the mounting bolts to install on the frame.

C. Composition

1. Power ON/OFF status lamp installed inside
   a) Color : RED
2. Fuse for Over current installed inside
   a) AC110~220V fuse : 1 EA,
      (1) Capacity : 2A
   b) C24V fuse : 1 EA
      (1) Capacity : 3A
3. DC24V ON/OFF status LED installed inside
   a) Color : Green

D. Module Specification

Electricity / Mechanism	
Power used	DC 24V, max 3A
Input power	AC 110~220V (Free volt) 50 / 60Hz
Connection type	4mm Safety socket
Dimension	96(W) × 173(H) × 105(D)

E. PCB connecter pin assign

PIN	MP0	S0	F0	L0
1	F0 (2)	MP0 (4)	L0 (2)	H0, H1
2	H2, H3	N (AC)	MP0 (1)	F0 (1)
3	⏚	L (AC)	-	-
4	S0 (1)	-	-	-
5	L (AC)	-	-	-

☐ Caution

Do not apply much strength on the equipment, it may cause damage on it.

☐ Note

When the lamp is off, check the fuse first and replace it if necessary.

XV. List of components

A. Controller - PLC (OMRON)

1. PLC unit : 12 inputs, 8 outputs, 2 channel analog input, 1 channel analog output [OMRON] CP1E-NA20DT-D
2. PLC expansion unit : 12 inputs, 8 outputs, [OMRON] CP1W-20EDT
3. Battery : [OMRON] CP1W-BAT01 (Option)

B. EMG S/W & BUZZER

1. Buzzer : 1 EA
2. Emergency switch : 1b, Turn-reset type

C. TOGGLE S/W

1. Toggle switch: 8 EA
2. Function : Remain(up), Return(down)

D. SUM ROTARY S/W

1. 0~9 Indication

E. ROTARY ENCODER

1. Output : 3 types
2. Output : NPN Open collector
3. Power : DC24V

F. FND (7 - SEGMENTS)

1. RED LED, binary type
2. Indication of number : 0~9
3. Indication of alphabet : A~F
4. DOT indication included

G. VOLT GENERATOR

1. Power generator : 2EA (0~10V)

H. VOLT & AMPERE METER

1. Each volt and current indicator (Total 2)
   a) Number of digit : 4digit (7segment Red LED)
   b) Input range : 19.99V
   c) Tolerance : ±0.,2%
   d) Sampling period : 300ms
   e) Fuction : Binary type
   f) Frequency : 2.5 cycle/min

I. MOTOR & SENSOR

1. Motor : DC gear motor, 1EA
   a) Reducer (1/30)
   b) Output cycle: about 190RPM
   c) Current : about 0.3A (free resistor)
   d) Output torque : 0.39kgf.cm
2. Sensors : Micro photo sensor, 2EA
   a) Allowed output current : 100mA Max
   b) Frequency : 1kHz min

J. ANALOG IN/OUT

1. 2 current and voltage input channels, 1 output channel

K. DC HUB

1. Power distributor module
2. DC24V power distributor

L. DIGITAL INPUT 24P (NPN)

1. Input : 24 points
2. Status indicator LED installed inside
   a) Color : Green

M. DIGITAL OUTPUT 12P (NPN)

1. Output : 16points
2. Status indicator LED installed inside
   a) Color : RED

N. POWER SUPPLY

1. Input power : 88~264VAC (100~240VAC recommended)
2. Input frequency : 50~60Hz
3. Power ON/OFF status indicator lamp installed
4. Overload fuse installed
5. DC24V ON/OFF status LED installed

O. Power Cable 2m: 1ea

P. PLC connection Cable : 1set

Q. 4mm safety socket Cable : 1set

1. Red 250mm : 5ea
2. Red 500mm : 4ea
3. Red 1000mm :1ea
4. Black 250mm : 15ea
5. Black 500mm : 20ea
6. Black 1000mm :2ea
7. Blue 250mm : 5ea
8. Blue 500mm : 4ea
9. Blue 1000mm : 1ea

R. Operation Manual : 1 set

S. PLC Application program CD : 1 set (OPTION, Customized)

T. Tools and devices for Maintenance : 1set (one single set)

PART A.

A-1. Instruction for safety

A-2. Maintenance

PART B.

B-1. Introduction

B-1-1. Summary

B-1-2. Assembly Process

B-1-3. Components

PART C.

C-1. Appendices

C-1-1. Drawings

C-1-2. Pictures

C-1-3. Program

C-1-4. PCB Circuit

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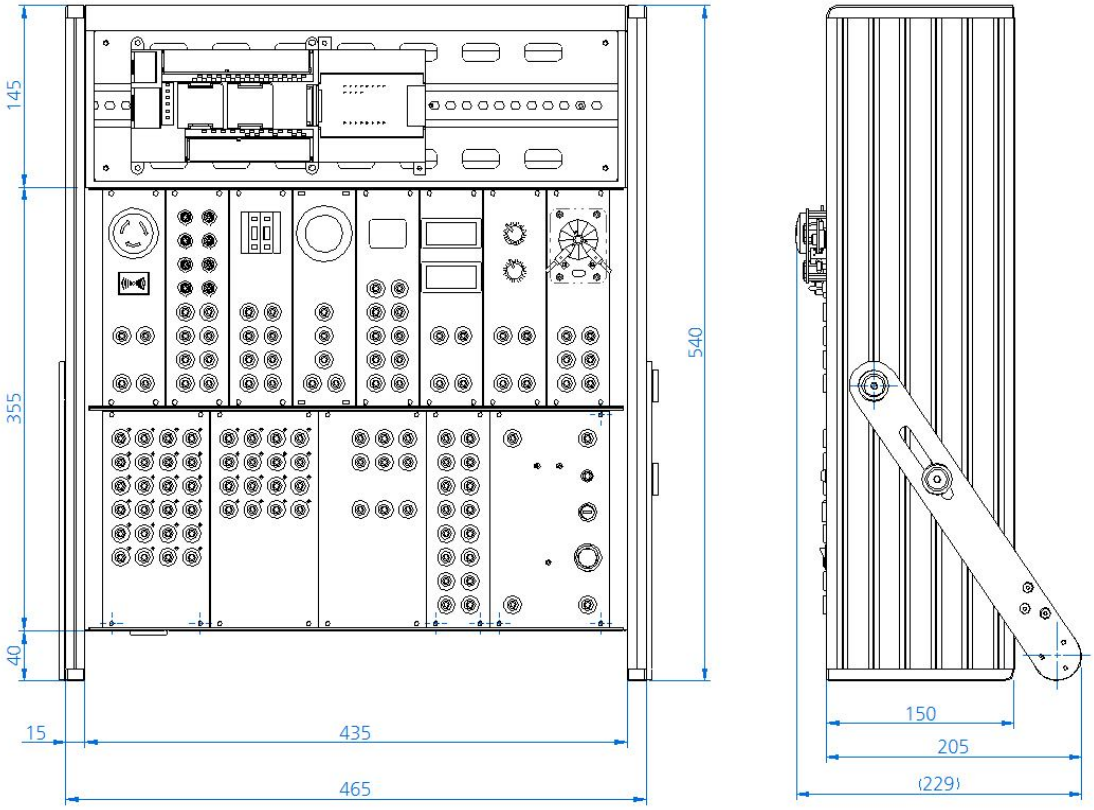
DHANDY MECHA

◈ Appendix

I. Configuration

A. External view



※ Reference configuration may be different from the actual.
※ There may change with the reason for development.

Ⅱ. Pictures

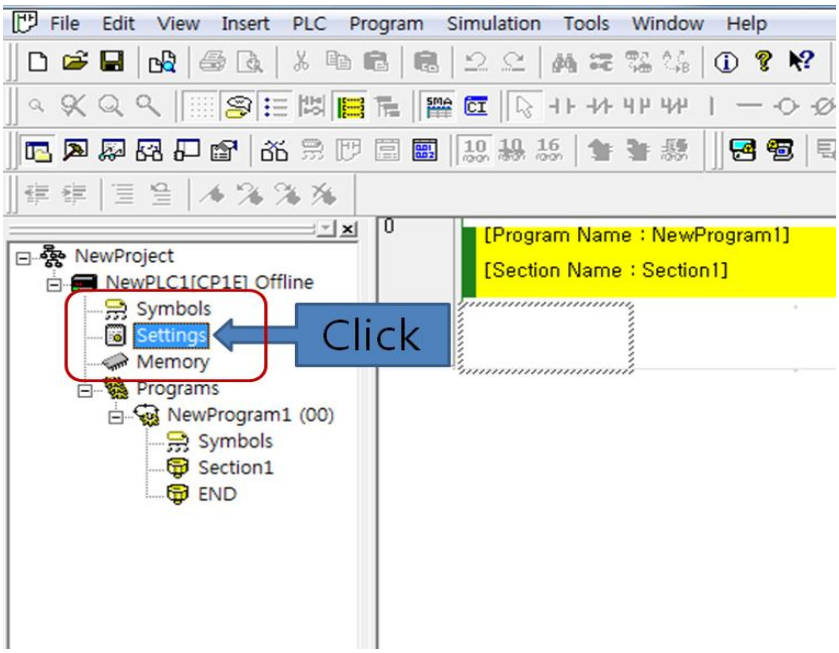
※ Different quality from the actual one.

※ There may change with the reason for development.

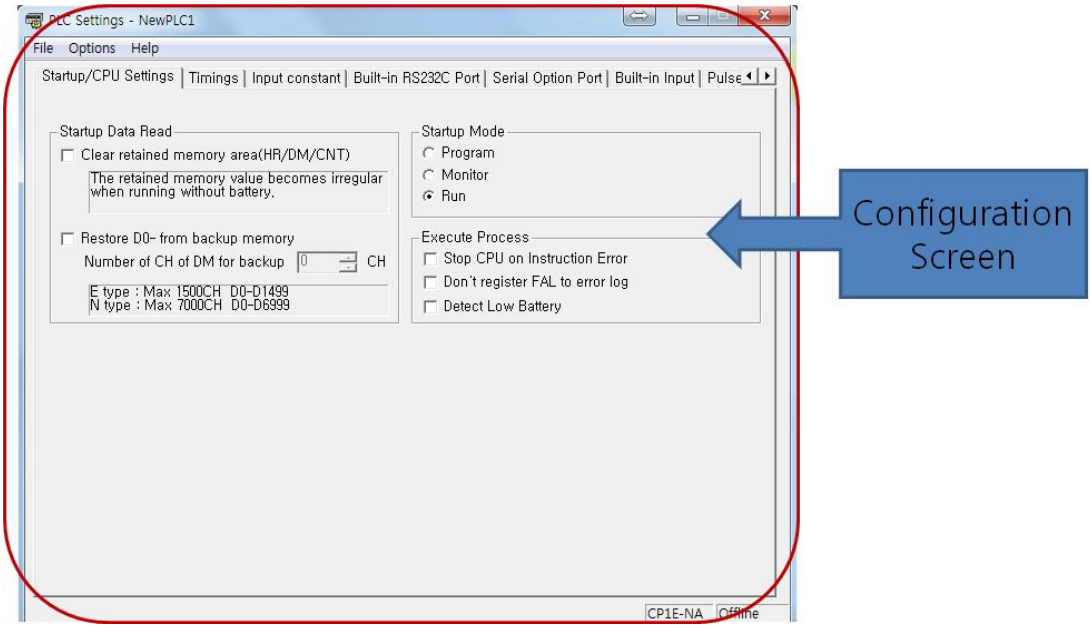
Ⅲ. Program

A. Programing procedure related to analog input and output

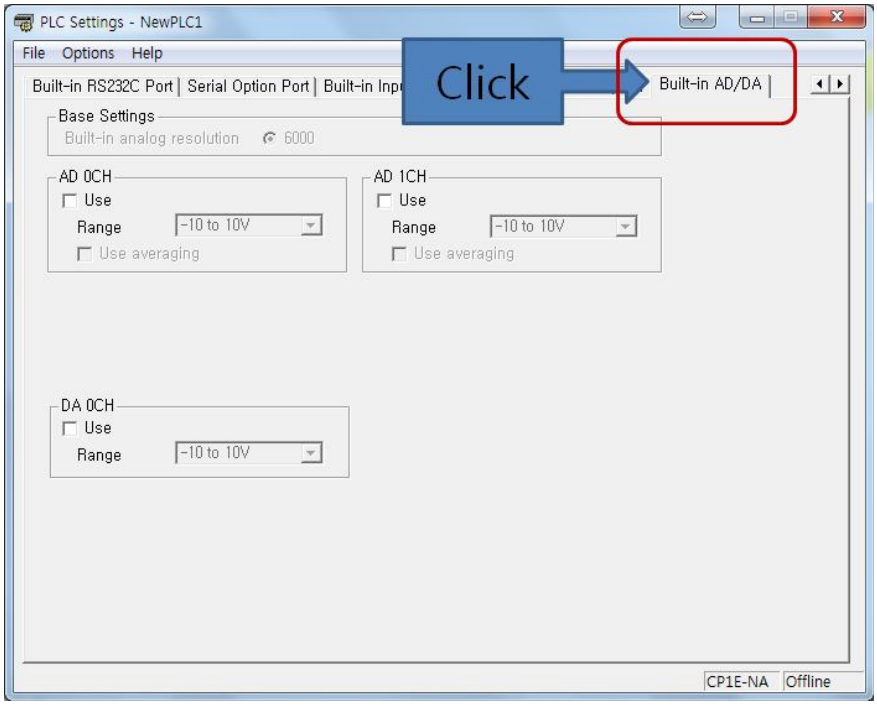
1. After running PLC software, click the box shown below.



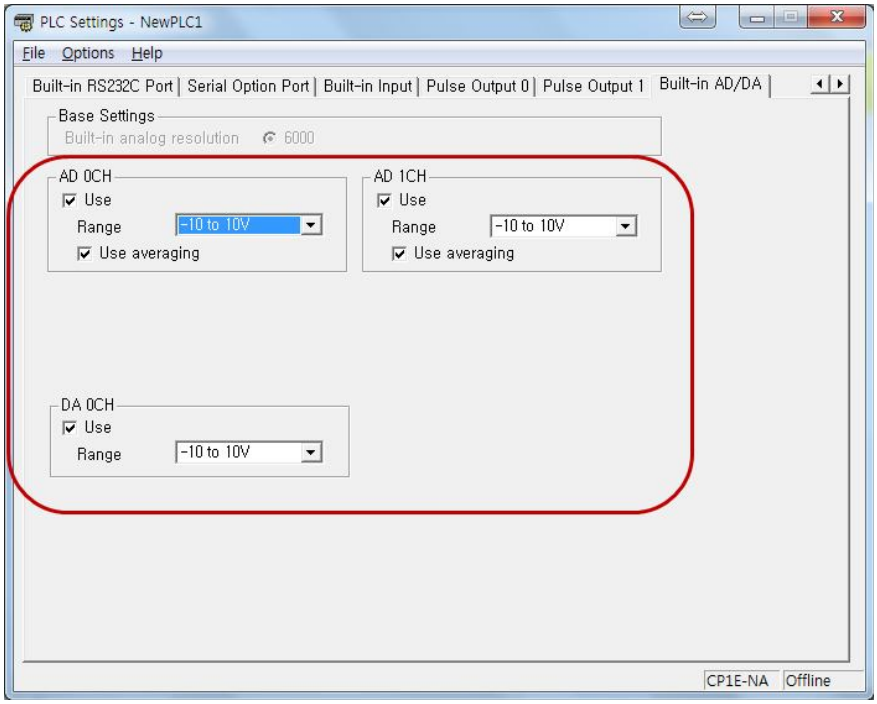
2. The following figure will show up after clicking.


PLC Settings - NewPLC1
File Options Help
Startup/CPU Settings | Timings | Input constant | Built-in RS232C Port | Serial Option Port | Built-in Input | Pulse
Startup Data Read
Clear retained memory area(HR/DM/CNT)
The retained memory value becomes irregular when running without battery.
Restore D0- from backup memory
Number of CH of DM for backup
CH
E type : Max 1500CH D0-D1499
N type : Max 7000CH D0-D6999
Startup Mode
Program
Monitor
Run
Execute Process
Stop CPU on Instruction Error
Don't register FAL to error log
Detect Low Battery
CP1E-NA
Offline
Configuration Screen

3. Click AD/DA on the top of the right hand side in the following figure

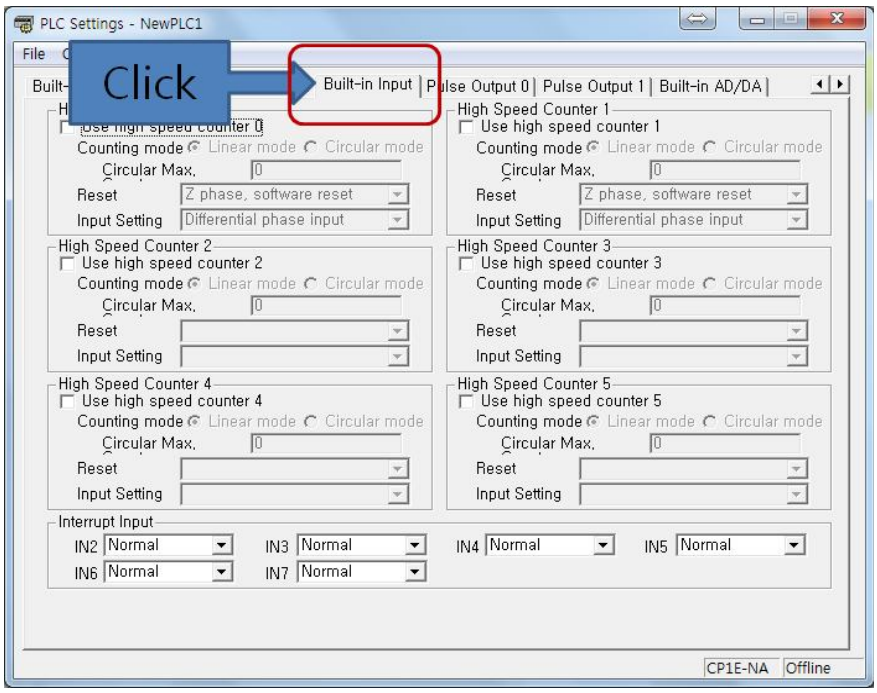


4. Check the box and choose the range of analog input and output source.

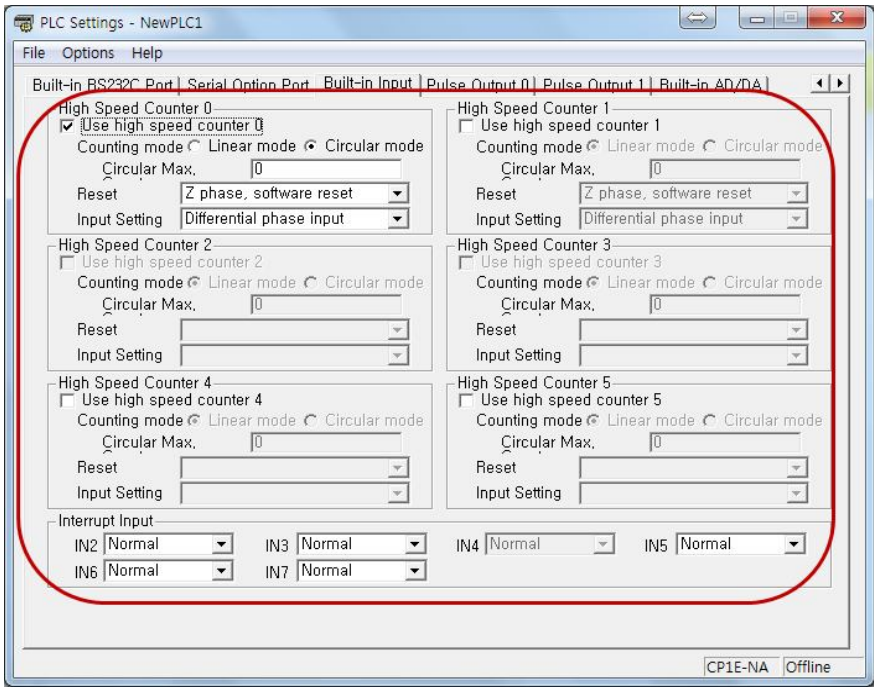


B. Set up for the high speed counter controller

1. Click set-up like the previous step performed.
2. Click built-in input on the top of the right hand side



3. Check the high speed counter to be used.

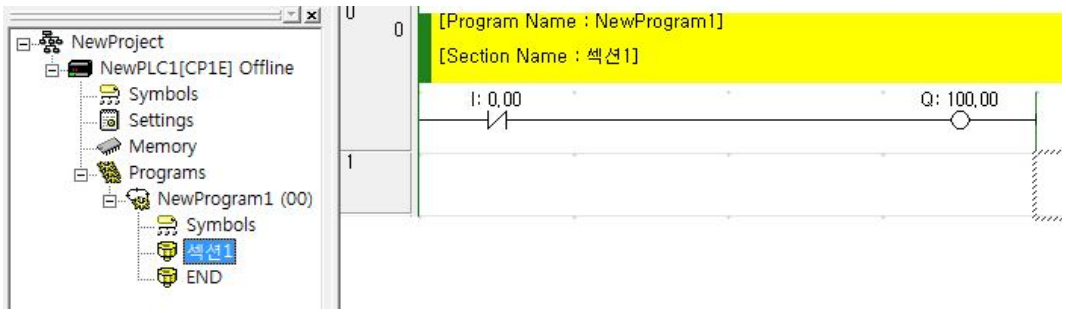


4. List of inputs for high speed counter and pulse.

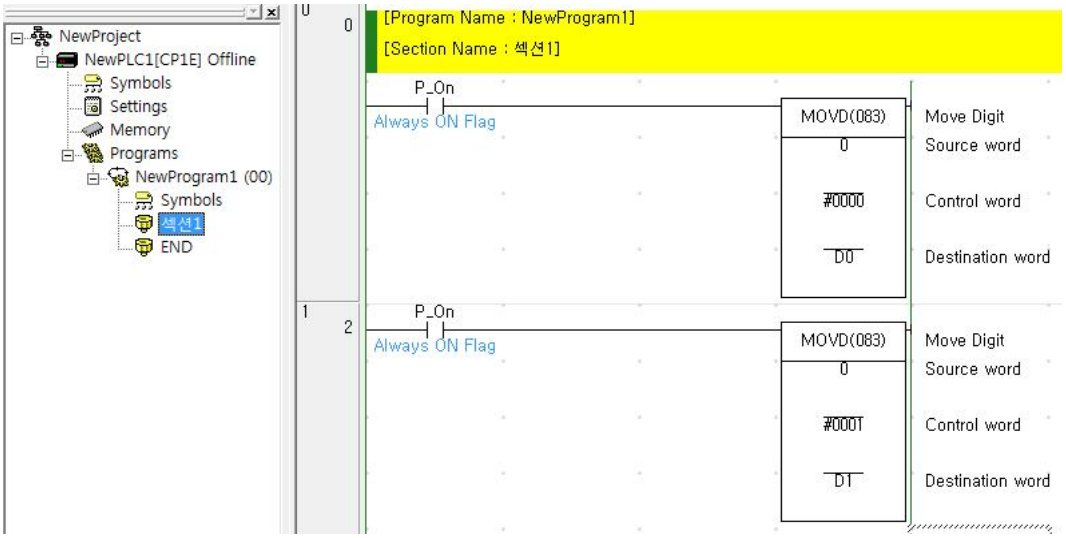
Terminal block label	Terminal number	PLC Setup						
		Interrupt input settings on Built-in Input Tab Page			High-speed counter 0 to 3 settings on Built-in Input Tab Page			Origin search settings on Pulse Output 0/1 Tab Page
		Normal	Interrupt	Quick	Use			Use
		Normal input	Interrupt inputs	Quick-response inputs	Increment pulse input	Differential phase ×4 or up/down	Pulse/direction	Origin search
CIO 0	00	Normal input 0	–	–	Counter 0, increment input	Counter 0, phase A or up input	Counter 0, pulse input	–
	01	Normal input 1	–	–	Counter 1, increment input	Counter 0, phase B or down input	Counter 1, pulse input	–
	02	Normal input 2	Interrupt input 2	Quick-response input 2	Counter 2, increment input	Counter 1, phase A or up input	Counter 0, direction	–
	03	Normal input 3	Interrupt input 3	Quick-response input 3	–	Counter 1, phase B or down input	Counter 1, direction	–
	04	Normal input 4	Interrupt input 4	Quick-response input 4	Counter 3, increment input	Counter 0, phase Z or reset input	Counter 0, reset input	–
	05	Normal input 5	Interrupt input 5	Quick-response input 5	Counter 4, increment input	Counter 1, phase Z or reset input	Counter 1, reset input	–
	06	Normal input 6	Interrupt input 6	Quick-response input 6	Counter 5, increment input	–	–	Pulse 0: Origin input signal
	07	Normal input 7	Interrupt input 7	Quick-response input 7	–	–	–	Pulse 1: Origin input signal
	08	Normal input 8	–	–	–	–	–	–
	09	Normal input 9	–	–	–	–	–	–
	10	Normal input 10	–	–	–	–	–	Pulse 0, Origin proximity input signal
	11	Normal input 11	–	–	–	–	–	Pulse 1, Origin proximity input signal
CIO 1	00 to 05	Normal input 12 to 17	–	–	–	–	–	–
	06 to 11	Normal input 18 to 23	–	–	–	–	–	–
CIO 2	00 to 11	Normal input 24 to 35	–	–	–	–	–	–

C. Program example

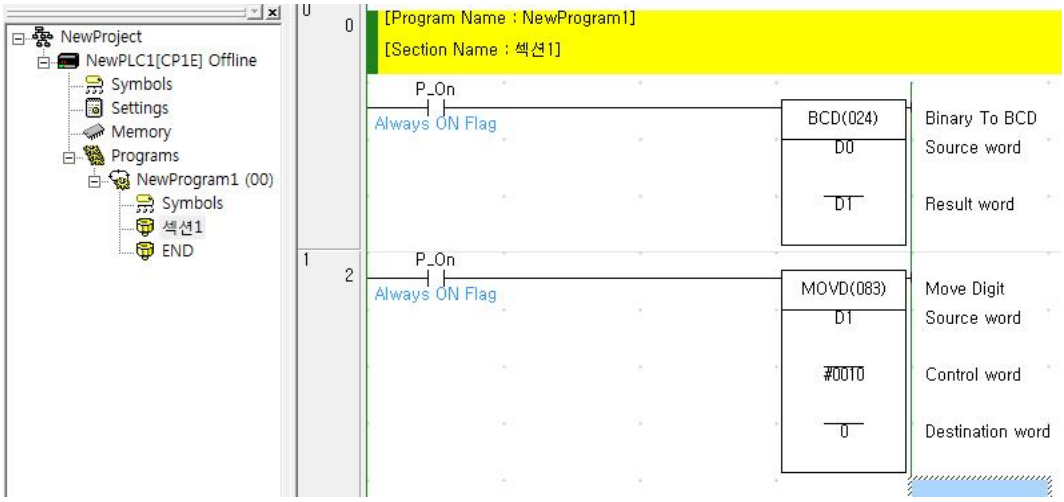
1. Buzzer in case of emergency



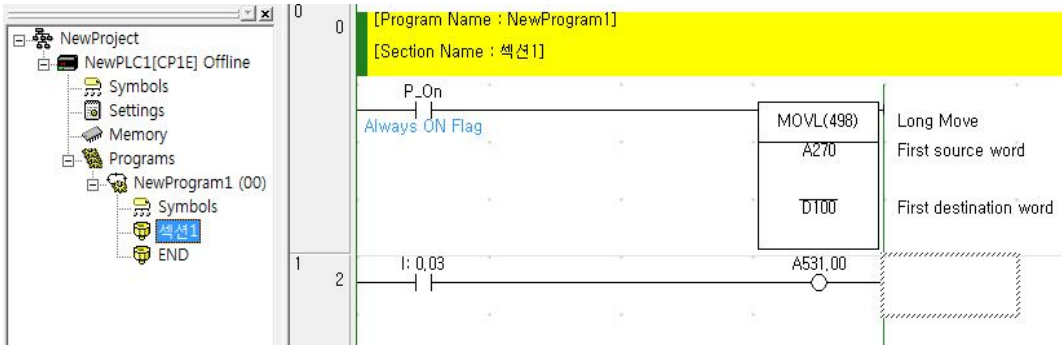
2. SUM ROTARY S/W Control



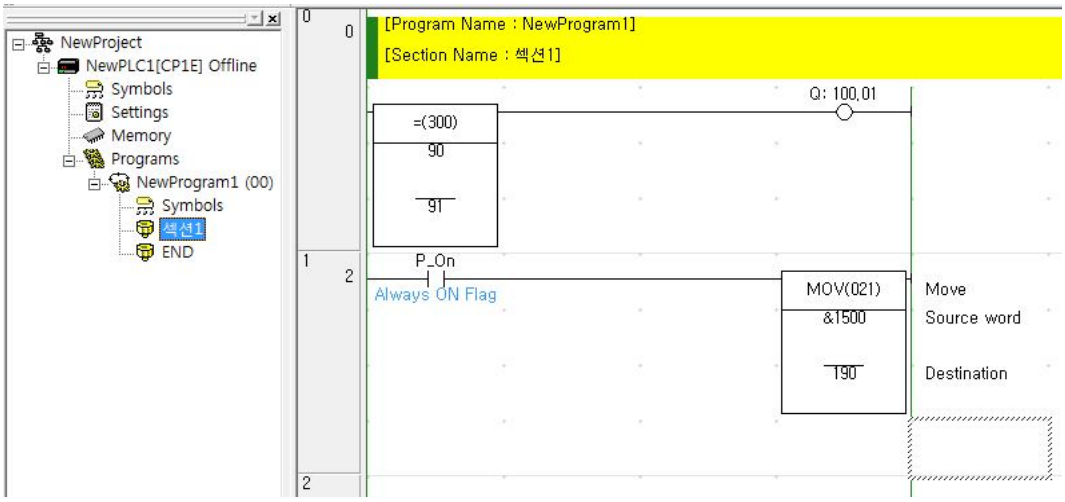
3. FND (7-SEGMENT) Control



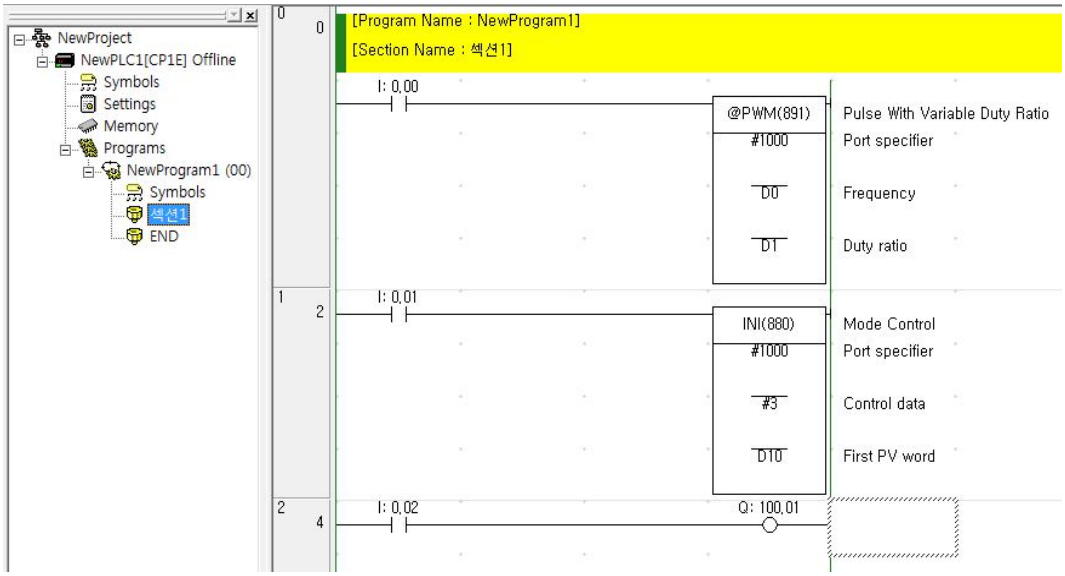
4. Encoder Control



5. Analog input and output control



6. PWM Control



END